

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in the Manufacture of Laminated Sheet Materials

I, ALEXANDER SAUER, a French Citizen, of Löwenstrasse 40, Zurich, Switzerland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

An object of this invention is to provide a process for the manufacture of a laminated sheet material having an outer facing united to a sheet which contains natural or artificial rubber, whereby the rubber-containing sheet imparts flexibility to the laminated material.

Accordingly, the invention provides a process for the manufacture of a flexible laminated sheet material, wherein a facing of one or more layers of flexible fibrous material impregnated with a thermosetting resinous condensation product and a preformed sheet of a vulcanisable natural or artificial rubber composition containing at least 5 per cent, calculated on the weight of the rubber, of a thermosetting resinous condensation product, which is the same as or is compatible with the first mentioned condensation product, are united by hot pressing under conditions such that the rubber undergoes vulcanisation and the condensation product or products is or are hardened.

The vulcanisable sheet may be prepared by mixing a thermosetting resinous condensation product with the ingredients of a vulcanisable natural or artificial rubber composition, which may contain, in addition to the rubber and a vulcanising agent, the usual ingredients of such compositions, such as a vulcanisation accelerator, an activator and a filler. The temperature during the mixing is preferably sufficient to melt the condensation product, and the mixing operation may be carried out on mixing rollers such as are used for preparing rubber mixes. If the mixing is carried out at a temperature likely to cause vulcanisation of the rubber, it is preferable to

add the accelerator towards the end of the mixing operation. When an intimate and uniform mixture has been obtained, the mixture is rolled into sheet form. It is desirable that during the mixing and/or rolling operation the condensation product should undergo partial polymerisation to an extent such that the vulcanisable sheet will not become liquid during the hot pressing operation. However, the condensation product is not finally hardened at this stage, since the final hardening must be carried out during the hot pressing of the vulcanisable sheet and the facing.

While the vulcanisable rubber composition must contain at least 5 per cent of a resinous condensation product calculated on the weight of the rubber, the relative proportions of the condensation product and the rubber may vary within wide limits depending on the degree of flexibility or resilience desired in the rubber-containing sheet after vulcanisation. For example, the proportion of the condensation product may be within the range of 10 to 300 per cent calculated on the weight of the rubber.

For the facing there may be used any desired flexible fibrous materials, such as wood veneer, paper, cardboard or a textile fabric, for example, of rayon, cotton, linen, hemp or jute. The fibrous material is impregnated with a thermosetting resinous condensation product, and, if desired, a plurality of layers of the impregnated material may be used to form the facing.

A sheet of wood veneer impregnated with the condensation product may be united by hot pressing with a vulcanisable sheet containing rubber and a resinous condensation product to produce a flexible laminated material having a glossy facing exhibiting the grain of the wood. The rubber-containing sheet thus united as a backing to the wood veneer improves the flexibility and resistance to breaking of the veneer especially in a

direction transversely of the grain. Such a flexible wood veneer is very suitable, for example, for covering the walls of rooms and other surfaces, such as furniture, for example, the tops of tables.

For the facing there may also be used a sheet of paper, cardboard or textile fabric bearing a design, picture or inscription, for example, a printed design, a printed or written inscription, a painted picture, or a photograph. The sheet is impregnated with a resinous condensation product and united with the design, picture or inscription outermost to the rubber-containing sheet to produce a flexible laminated sheet having the design or the like protected by a glossy transparent film of the hardened resin.

If desired, the facing may be formed by interposing between a flexible fibrous material impregnated with the condensation product and the vulcanisable sheet a non-impregnated flexible fibrous material through which condensation product from the impregnated material penetrates during the hot pressing operation. Thus, for example, the non-impregnated material may be a sheet bearing a design, picture or inscription as described above, and the impregnated material may be of thin paper or gauze fabric which is rendered substantially transparent by the condensation product during the hot pressing operation so as to render the design or the like visible through the resin-treated paper or fabric.

The thermosetting resinous condensation product or products may be chosen, for example, from among melamine-formaldehyde, phenol-formaldehyde, cresol-formaldehyde, and urea-formaldehyde condensation products. The condensation product present in the facing may be the same as that present in the vulcanisable sheet, or it may be different from that present in the vulcanisable sheet provided that both condensation products are compatible with one another.

It may also be of advantage to unite as a

reinforcement a layer of a non-impregnated textile fabric by the hot pressing operation to the rear surface of the vulcanisable sheet.

The following Example illustrates the production of a flexible laminated sheet in accordance with the invention:

Crude rubber is worked on a roller mill. It is then mixed with a melamine-formaldehyde condensation product by means of rollers heated at 40-50°C. The sulphur and filler are then added, but not the accelerator. The mixture is then worked on a roller mill heated at about 120°C. so as to cause polymerisation of the condensation product and with the rollers urged very close together, so that the mixture is withdrawn as a paper-thin sheet, the sheet being removed from the roller by means of a doctor blade. This treatment is carried on for about 3-4 minutes until the condensation product has been semi-polymerised. This can be recognised by the fact that the material acquires a gloss and loses its rubbery character and resembles an artificial plastic. The accelerator is incorporated in the mixture as near to the end of the treatment as possible, so that the rubber does not undergo vulcanisation at the temperature of 120°C. at which it is being worked. The material is then cooled, and worked up on an ordinary calender heated at about 40-50°C. into a sheet of the desired thickness.

A sheet of paper or wood veneer is impregnated by immersion in a solution of a phenol-formaldehyde condensation product, and then dried. The impregnated sheet is then placed in contact with the preheated rubber-resin sheet, and the assembly is inserted in a press and compressed at 130°C. under a pressure of 70 kilograms per square centimetre for 3-5 minutes, whereby the rubber is vulcanised and the resinous condensation product is hardened.

Examples of compositions suitable for making the rubber-resin sheet in the manner described above are as follows:—

		A	B	
95	Melamine-formaldehyde condensation product	1.0 kilogram	2.5 kilograms	95
	Natural or artificial rubber	2.5 kilograms	1.0 kilogram	
	Filler (kaolin, wood meal, etc.)	6.3 kilograms	6.3 kilograms	
	Zinc oxide	200 grams		
	Sulphur	50 grams	50 grams	
100	Accelerator	100 grams	100 grams	100

What I claim is:—

1. A process for the manufacture of a flexible laminated sheet material, wherein a facing of one or more layers of flexible fibrous material impregnated with a thermosetting resinous condensation product and a preformed sheet of a vulcanisable natural or artificial rubber composition containing at least 5 per cent, calculated on the weight of

the rubber, of a thermosetting resinous condensation product, which is the same as or is compatible with the first mentioned condensation product, are united by hot pressing under conditions such that the rubber undergoes vulcanisation and the condensation product or products is or are hardened.

2. A process as claimed in Claim 1. wherein a sheet of wood veneer impregnated with

a resinous condensation product is used as the facing.

3. A process as claimed in Claim 1, wherein a sheet of paper, cardboard or textile fabric bearing a design, picture or inscription on its outer surface and impregnated with a resinous condensation product is used as the facing.

4. A process as claimed in Claim 1, wherein the facing is formed by interposing between a flexible fibrous material impregnated with the condensation product and the vulcanisable sheet a non-impregnated flexible fibrous material through which condensation product from the impregnated material penetrates during the hot pressing operation.

5. A process as claimed in Claim 4, wherein the non-impregnated material bears a design, picture or inscription on its outer surface and the impregnated material is of thin paper or gauze fabric which is rendered substantially transparent by the condensation product during the hot pressing operation so as to render visible the said outer surface.

6. A process as claimed in any one of Claims 1-5, wherein the vulcanisable sheet is prepared by mixing a thermosetting resinous condensation product with the ingredients of a vulcanisable natural or artificial rubber

composition at a temperature sufficient to melt the condensation product, and then bringing the mixture into sheet form by rolling.

7. A process as claimed in Claim 6, wherein during the mixing and/or rolling operation the condensation product is caused to undergo partial polymerisation to an extent such that the vulcanisable sheet will not become liquid during the hot pressing operation.

8. A process as claimed in any one of Claims 1-7, wherein the resinous condensation product or products is or are chosen from among melamine-formaldehyde, phenol-formaldehyde, cresol-formaldehyde or urea-formaldehyde condensation product.

9. A process as claimed in any one of Claims 1-8, wherein a non-impregnated textile fabric to serve as a reinforcement is united by the hot pressing operation to the rear surface of the vulcanisable sheet.

10. A flexible laminated sheet material which has been made by the process claimed in any one of Claims 1-9.

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